The present work is concerned with Computational Fluid Dynamic (CFD) modelling of turbulent mixing in a confined wake flow. The flow channel has a cross-section of 60 x 60 mm2 and a total length of 970 mm. The first part of the channel is divided by a block of size 20x60 mm2 into two smaller feed channels with cross sections of 20x60 mm2 and lengths of 330 mm. The bulk velocities in the feed channels are 0.17 m/s, which gives a Reynolds number based on the feed channel hydraulic diameter of 5100. The fluid considered is water.

The turbulent flow is modelled in two-dimensions by solving the Reynolds Averaged Navier-Stokes equations in combination with a standard k - ε turbulence model and two modifications of this model, the RNG k - ε model and the Chen-Kim k - ε model. Two different micro-mixing models are adopted, namely the Multiple-Time-Scale (MTS) mixing model and the multi-peak presumed PDF-model.

The numerical results from the two mixing models are compared with each other and with experimental data obtained by using the combined PIV/PLIF technique to measure instantaneous concentration and velocity fields. The measurements were performed at two slightly overlapping areas in the initial mixing zone and at an area at the end of the mixing channel. The measurements revealed that there is a recirculation zone right behind the block that gives an increased mixing effect in this area. The measurement at the end of the channel showed that the concentration distribution is quite uniform, but the two streams are not completely mixed.

Predicted and measured transverse profiles of mean and fluctuating velocities and concentrations are compared at three different axial positions in the mixing channel. Good agreement with experimental data is found for the mean and the fluctuating velocities at all three positions. However, the predicted wake tends to recover slower than the measured one. For the mean and fluctuating concentrations, both mixing models tend to produce numerical results that agree well with the experimental data in the near wake. In the far wake, however, better agreement is found by reducing the turbulent Schmidt number.